

B<sup>3</sup>  
dioxide step; and wherein (c) is practiced so as to provide a chlorine dioxide dosage of between about 0.5-2.0% active chlorine during the practice of the second chlorine dioxide step.

Please add the following new claim:

B<sup>4</sup>  
41. (New) A method as in claim 39, wherein step (c) is practiced for less than 10 minutes.

#### REMARKS

Entry of the amendment instructions above, and favorable reconsideration and allowance of this application are requested.<sup>2</sup>

Applicants have proposed that each of independent claims 21, 35 and 39 be amended by defining the treatment is carried out in a first chlorine dioxide stage of an elemental chlorine free bleaching sequence. It is clearly described on page 1 to 2 of the specification that the present invention relates to elemental chlorine free process, that is, no chlorine (Cl<sub>2</sub>) is used, only chlorine dioxide. Furthermore, on page 6 it is described that the method according to the invention is carried out in the first chlorine dioxide stage in the bleaching sequence. Actually, it corresponds to the stage D<sub>2</sub> described in the paragraph bridging pages 1 and 2.

Claim 29 is also proposed to be amended so as to recite that, in step (b), the pulp is treated for 30-300 minutes.

Claim 41 is new and is based on the disclosure appearing at page 10, line 10 to 11.

Thus, claims 21-41 remaining pending in this application, of which claims 21, 35 and 39 have been further amended. All other claims are dependent either directly or indirectly from such independent claims.

<sup>2</sup> A formal Notice of Appeal is being filed concurrently herewith so as to toll the time period running against this application and provide the Examiner with sufficient time to consider the amendments and remarks herein.

Claims 21-40 have been rejected on art-based grounds for essentially the same reasons advanced in the prior action. Applicants respectfully submit that the amended claims presented herewith distinguish the invention at issue here over all applied art of record.

In this regard, the amended claims relate to **elemental chlorine-free** bleaching – i.e., bleaching in the absence of elemental chlorine. In direct contrast, the applied WO 91/05909 publication teaches that pulp is treated in a sequence (CD)ED. The first stage (CD) including chlorine is not a D stage, but a chlorination stage in which chlorine gas is the main bleaching agent and chlorine dioxide is used only in a small amount (see Table 3, Cl<sub>2</sub> 4.10 %, ClO<sub>2</sub> 0.46 %; see also pages 11 and 12 of applicant's response to the previous Office Action, the entirety of which is expressly incorporated hereinto by reference).

The Examiner still maintains that the WO 91/05909 teaches a second chlorine dioxide step as recited in claims 26, 36 and 39. However, applicants wish to point out that our DAD stage is not known or obvious from WO 91/05909, because there is no intermediate acid step between two ClO<sub>2</sub> steps in the WO '909 method. This is clearly disclosed e.g. on pages 29-30 of the WO '909 reference. The total chlorine dioxide dosage is added in two portions. The first portion is added to pulp so that the end pH of the first step of the pulp is 6-12 and pulp is treated at a temperature of about 70 °C for about 5-40 minutes. After that, the remaining ClO<sub>2</sub> portion is added and the end pH is 1.9-4.2, and the pulp is treated at a temperature of about 70 °C for about 2.5-2.9 hours. In present applicants' method, a second chlorine dioxide step is carried out after a long acid treatment (step b). The treatment time in the second chlorine dioxide step is less than 10 minutes (see page 10, line 10 to 11). New claim 41 has thus been added to cover such treatment time.

Carles and Histed do not relate to elementary chlorine-free bleaching processes as applicants have stated in their previous response. Thus, Histed does not teach anything about ClO<sub>2</sub> bleaching, but instead teaches a chlorination stage in which

chlorine is the main chemical and  $\text{ClO}_2$  is added only a small amount (page T36  $\text{Cl}_2$  is applied 4.49-8.96 % on pulp, and  $\text{ClO}_2$  0.14-0.29%.

On page 4 of the Office Action, the Examiner states that the wording "(b) in the chlorine dioxide stage effecting an acid treatment" indicates that the applicants' acid treatment takes place in the presence of chlorine dioxide as the second step of the reference according to page 8-9 and claim 1 of the WO reference. However, the wording mentioned above only means that the chlorine dioxide treatment and acid treatment in the original claim are effected in the same stage without washing between the steps.

In view of the amendments and remarks above, applicants believe that withdrawal of all art-based rejections of record is in order. Such favorable further action on the merits of this application is solicited.

#### **Information Disclosure Statement**

Attached hereto is a search report which was issued in connection with the applicants' corresponding EPO application. A copy of each cited publication is also attached, and is listed on an appropriate form PTO-1449 for the Examiner's convenience. Consideration is requested.

Respectfully submitted,

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**APPENDIX I**

**Marked-Up Version of Amended Claims Pursuant to 37 CFR §1.121(c)**

21. (Amended) A method of treating chemical cellulose pulp from an alkaline pulping process with chlorine dioxide in a first chlorine dioxide stage of an elemental chlorine free bleaching sequence, comprising:

- (a) bleaching the chemical cellulose pulp in a first chlorine dioxide step at a temperature over 70 °C for less than 10 minutes and so as to provide a chlorine dioxide dosage of between about 0.5-1.5 % active chlorine, and adjusting the pH of the pulp in the first chlorine dioxide step so that the final pH of the step is over 4; and then
- (b) effecting an acid treatment of [treating] the chemical cellulose pulp at a pH of between 2 - 5 and at a temperature of over 80°C for 30 - 300 minutes.

35. (Amended) A method of treating chemical cellulose pulp from an alkaline pulping process with chlorine dioxide in a first chlorine dioxide stage of an elemental chlorine free bleaching sequence, comprising:

- (a) bleaching the chemical cellulose pulp in a first chlorine dioxide step [and adjusting the pH of the pulp in the first chlorine dioxide step] so that the final pH of the step is over 5, and so that hexenuronic acid groups in the pulp substantially do not react with chlorine dioxide, and for a treatment time of between 30 seconds-three minutes; and then
- (b) acid treating the chemical cellulose pulp at a pH of between 2 - 5 and at a temperature of over 80°C for 30-300 minutes.

39. (Amended) A method of treating chemical cellulose pulp from an alkaline pulping process with chlorine dioxide in a first chlorine dioxide stage of an elemental chlorine free bleaching sequence, comprising:

- (a) bleaching the chemical cellulose pulp in a first chlorine dioxide step, and adjusting the pH of the pulp in the first chlorine dioxide step so that the final pH of the step is over 4, and then
- (b) acid treating the chemical cellulose pulp at a pH of between 2 - 5 and at a temperature of over 80°C for 30-300 minutes, and
- (c) after (b) bleaching the chemical cellulose pulp in a second chlorine dioxide step; and

wherein (a) is further practiced so as to provide a chlorine dioxide dosage of between about 0.1-1.0% active chlorine during the first chlorine dioxide step; and wherein (c) is practiced so as to provide a chlorine dioxide dosage of between about 0.5-2.0% active chlorine during the practice of the second chlorine dioxide step.